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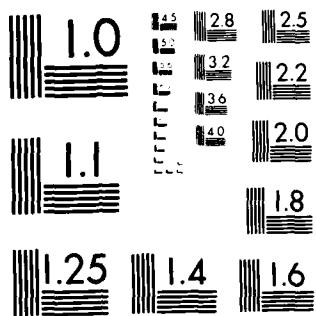
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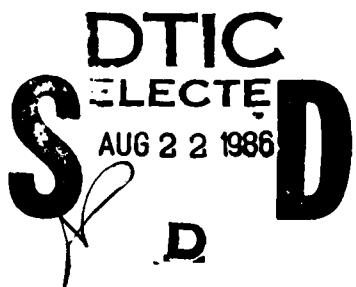
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# Implications of the Strategic Defense Initiative for ABM Treaty

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by

George R. Schneiter

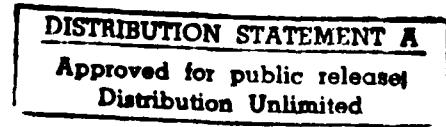


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George R. Schneiter

*Naval Warfare Operations*



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# Implications of the Strategic Defense Initiative for the ABM Treaty

GEORGE R. SCHNEITER

## Introduction

The Reagan Administration has made a marked departure from recent American administrations in its emphasis on strategic defence. The key element of this emphasis is the Strategic Defence Initiative (SDI), an effort aimed at developing an effective defence, largely space-based, against ballistic missiles. The degree to which the American public and Congress will support SDI remains to be seen. Considerable support exists for the concept of a defence against nuclear weapons, as opposed to just threatening to use them in retaliation. However, there is also great scepticism that a defence such as envisioned by the President is achievable. The debate may in the end focus on the net worth of a capable but imperfect strategic defence.

In any event, SDI is a current emphasis of the US strategic programme, joining a considerable build-up in US strategic offensive forces. The US defence budget has now begun to reflect increases in research on technologies applicable to a space-based defence. And the United States has enlisted the endorsement of her NATO allies for at least the research portion of SDI.

This article will examine the effect of this new direction in US defence policy on strategic arms control. It will focus particularly on questions raised for the 1972 Anti-ballistic Missile (ABM) Treaty, in the eyes of many the principal lasting achievement of the era of detente. This Treaty, which bans a territorial defence against strategic ballistic missiles and severely constrains other ABM activities, is the only one of the SALT agreements still legally in force.

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The article first reviews the strategic forces and programmes of the United States and Soviet Union, with emphasis on defensive forces. It then addresses the background and current status of the ABM Treaty. Finally, it identifies and discusses the critical issues with regard to the future of the ABM Treaty.

## Strategic Forces, Programmes, and Directions *Offensive Forces*

The American strategic offensive forces are well-balanced, with roughly equal emphasis on intercontinental ballistic missiles (ICBM), submarine-launched ballistic missiles (SLBM) and bombers equipped with bombs, short-range attack missiles (SRAM), and air-launched cruise missiles (ALCM). The United States has underway modernization programmes for all three legs of this strategic triad. The recent thrust has been to increase prompt hard-target kill capability and to improve the ability to penetrate air defences. A future emphasis is expected to be on improving the survivability of the ICBM force. The deployment of nuclear sea-launched cruise missiles (SLCM) has further diversified US nuclear forces, and the current deployment of the *Pershing* II ballistic missiles and ground-launched cruise missiles (GLCM) in Europe adds new capability to US Europe-based nuclear forces.

In her strategic offensive forces, the Soviet Union has in the past given primary roles to ICBM and SLBM, although the appearance of the *Blackjack* bomber and recent cruise missile developments indicate an increased role for airborne systems. The USSR also has active ICBM and SLBM modernization programmes. A recent emphasis has been on improving ICBM survivability by increased mobility. SLBM programmes will provide improved accuracy and additional warheads.

## *Defensive Forces*

The United States deployed extensive air defences - interceptor aircraft and the *Nike* series of surface-to-air missiles (SAM) - in the 1950s in response

to the Soviet bomber threat. Developments in SAM technology provided the base for US efforts to develop a defence against Soviet strategic ballistic missiles. The United States eventually decided her ABM technology could not provide a sure enough defence for protection of cities, so the objective shifted to defence of the *Minuteman* ICBM force. In the 1970s, the United States began deploying an ABM system to defend *Minuteman* silos but subsequently deactivated the system after concluding that advances in penetration aids, which the Soviet Union could eventually duplicate, would enable ballistic missiles to defeat such a system. Logic then dictated that, if the US could not defend against the powerful and growing Soviet ballistic missile force, it made no sense to maintain a costly air defence against the relatively weak Soviet bomber force. Consequently, in the early 1970s the US strategic defence mission was reduced to one of principally warning and airspace control, with only research and development on defence against ballistic missiles.

Based on the US ABM research and development efforts in the 1970s, a non-nuclear anti-satellite (ASAT) system appeared practical, and a programme was undertaken to develop such a capability.

This general approach to strategic defences continued until the Reagan Administration. Secretary Weinberger's Fiscal Year 1983 *Annual Report to the Congress* stated: 'We have virtually ignored our strategic defensive systems for more than a decade. . . . Our program ends these years of neglect'.<sup>1</sup>

The current status of US strategic defence programmes is as follows.

**Air defences.** Planned and continuing improvements include:

- Deployment of high-frequency over-the-horizon radars on the east and west coasts of the US for overwater surveillance.
- Modernization of the fence of ground-based microwave radars across northern Alaska and Canada by the installation of 52 new radars.
- Modernization of interceptor-aircraft forces with F-15s and F-16s.

**ASAT**

- Development of the miniature-vehicle ASAT, which would be launched by specially-equipped

F-15 aircraft to destroy or disable low-altitude satellites.

- Deployment of a network of ground-based electro-optical sensors for space surveillance.

**ABM**

- Upgrading of ballistic missile early warning capability through modernization of launch-detection satellites and ballistic missile early warning system (BMEWS) radars in Greenland and England.
- Plans to build two *Pave Paws* radars, in Texas and in Georgia, for detecting and tracking SLBM. These radars will add to the coverage already provided by the *Pave Paws* radars in Massachusetts and California and the Perimeter Acquisition Radar Characterization System (PARCS) radar in North Dakota.

But the most far-reaching and controversial aspect of the US strategic defence efforts is the part that has, since President Reagan's 1983 speech, been consolidated under the SDI programme. This programme is chartered to explore key technologies permitted by the ABM Treaty so that a future President and Congress will have technical options to decide whether to embark on development and deployment of strategic defences against ballistic missiles'.<sup>2</sup> The United States makes clear that the programme is now in only the 'research' phase, an important distinction given the ABM Treaty's limitations on 'development', the stage following research.

The Department of Defense describes four phases in the SDI program:<sup>3</sup>

- *Research phase*, from now to the early 1990s, when a decision could be made on proceeding into systems development.
- *Systems development phase*, during which prototypes of defence system components are designed, built and tested.
- *Transition phase*, during which there is incremental, sequential deployment of defensive systems by both sides, accompanied or preceded by significant reductions in nuclear ballistic missiles.
- *Final phase*, when deployments of highly effective, layered defences are completed and ballistic missile force levels reach a minimum, defences are incorporated against other means

of nuclear attack, if similar technical progress in such defences has been attained by that time.

This progression represents the most extensive ABM deployment the US might undertake. Presumably the Soviet Union would undertake similar deployments. The foregoing description of the SDI programme suggests that effective defences against other means of nuclear attack, e.g., ALCM, would *not* be a necessary condition for a US decision to proceed with such extensive ABM deployments. However, it is unlikely that such an expensive programme would get Congressional support without assurance that other delivery means, especially airborne systems, could also be thwarted.

The principal functions and elements in the SDI programme are the following:

- Warning, surveillance, tracking, battle management: through satellite-borne sensors, principally passive detectors of infrared radiation.
- Discrimination of re-entry vehicles (RV) from penetration aids: through optical sensors, imaging radars.
- Destruction of missiles during boost and RV-deployment phase and (less efficient) destruction of RV during midcourse phase through:
  - Satellite-based chemical lasers, electromagnetic rail guns, X-ray lasers, particle-beam generators, rocket-powered interceptors.
  - Submarine-launched X-ray laser generators.
  - Ground-based lasers reflected from satellite-based mirrors.
- Destruction of RV during terminal phase: through interceptor missiles, using non-nuclear kill mechanisms.

The SDI programme emphasizes space-based components because of the desirability of countering ballistic missiles early in their trajectories. The missiles may be more vulnerable during this phase because their boost and guidance systems are still operating. Also they offer fewer, more lucrative targets then, because the post-boost deployment systems have not yet dispersed the warheads on their individual trajectories. For midcourse or terminal-phase destruction of the RV, techniques that would allow each defence element to defend a larger area are preferred because they minimize

the number of such elements required to protect against attacks that might be concentrated against a few particular targets. As will be discussed later, both space basing and wide-area coverage run counter to the objectives and the limitations of the ABM Treaty.

US policy regarding ABM could, of course, in time shift to other directions; such shifts have occurred in the past. Several alternative directions might be pursued.

One possibility would be to try to extend the ABM Treaty, perhaps with increased restrictions on ABM deployments, developments, or possibly even research. Soviet statements regarding their arms-control objectives appear to indicate that they would favour this course, with a comprehensive ban on 'scientific research', development, testing and deployment of 'space strike arms', defined by Moscow as arms designed to strike targets in space from earth or to strike targets on earth from space.<sup>4</sup>

Another possibility would be to go ahead with a limited deployment of ABM systems to defend strategic offensive forces such as ICBM. Prior to the advent of SDI, defence of ICBM provided the principal incentive for US ABM development. The ABM Treaty explicitly permits limited deployments for that purpose, and as noted earlier the US operated such a system briefly in the early 1970s. In the late 1970s the United States considered deploying another ABM system, the Low-Altitude Defence System (LOADS), for protecting the MX ICBM. Both the MX and the LOADS launchers were to be moved occasionally to make it harder for the Soviet Union to target them confidently. Some changes to the ABM Treaty would have been required to accommodate LOADS as envisioned then. However, it clearly was not an area-defence system, it would have been consistent with the original objectives of the Treaty, and the Treaty changes required (to permit land-mobile components and more radars, launchers and missiles) would have been reasonable. With MX now planned to be based only in fixed silos, LOADS has less appeal. However, a mobile small ICBM might benefit from such a defence.

A third possibility is that some elements of an SDI-type defence could be deployed to defend offensive-force or C<sup>3</sup> assets, perhaps without

requiring much change to the Treaty. However, these elements would probably provide some wide-area-defence capability, contrary to the Treaty's objectives.

In contrast to the United States, the USSR has, since World War II, given strong and continued emphasis to strategic defences. She has spent vast sums on defences against US long-range bombers, in addition to the more immediate threat of the shorter-range bombers of surrounding countries. The recent upgrading of Soviet air defences – including deployment of the low-altitude-capable SA-10 SAM, the SA-X-12 SAM/anti-tactical ballistic missiles (ATBM), and interceptor aircraft capable of engaging low-flying targets – makes penetration by US bombers and cruise missiles more difficult. Nevertheless, the US apparently believes Soviet air defences will still be penetrable – in the near term with the ALCM and the B-1B bomber, and in the longer term with the 'stealth' Advanced Technology Bomber.

In the ABM field, the USSR has maintained an operational ABM system around Moscow since before the signing of the 1972 ABM Treaty and has recently begun to upgrade it, within the confines of the Treaty's obligations. The Soviet Union is adding a new high-acceleration interceptor; increasing the number of ABM missiles to the permitted ceiling of 100; upgrading her battle-management system with a large, four-sided, phased-array radar near Pushkino; and completing early warning coverage with a new, large, phased-array radar near Krasnoyarsk, the last in violation of the Treaty.

The USSR continues programmes in advanced technologies applicable to strategic defence –

high-energy lasers and particle beams, for example – as well as in the manned and unmanned use of space for military purposes. She has an operational low-altitude ASAT system based principally on ballistic-missile technology, and ground-based lasers that could interfere with US satellites.

According to the DOD, 'Soviet programs for the development and application of directed-energy technologies to strategic defense have been very vigorous in the past and will continue to be so in the future, irrespective of what the US does about new strategic defense initiatives'. The DOD cites these potential developments and deployments<sup>5</sup> (see table on p. 216).

Finally, the USSR has put considerable resources into passive defence, aimed primarily at protecting leadership, armed forces and industrial capacity. The extent to which these measures would be effective in a nuclear exchange is controversial.

The scope of all this activity has prompted many to believe the Soviet Union plans to withdraw from the ABM Treaty and deploy an extensive ABM system. Alternatively, she may only be maximizing her defence under the Treaty and hedging against US developments.

#### Strategic Arms Control

The initial efforts to control nuclear arms were aimed at reducing the hazards of nuclear testing. These efforts produced the 1963 multilateral Limited Test Ban Treaty, which bans nuclear explosions in the atmosphere, in outer space, and under water; and the 1967 multilateral Outer Space Treaty, which bans placing nuclear weapons in earth orbit.

More public attention has focused on later negotiations aimed at limiting the delivery means of nuclear weapons, particularly strategic delivery

#### Soviet Programmes on Strategic Defences

	ASAT	Air Defence	ABM
Ground-based laser	IOC* end of 1980s	IOC late 1980s (point defence)	Component test early 1990s IOC 2000s
Airborne laser	IOC early 1990s	IOC early 1990s	—
Spaced-based laser	Prototype late 1980s	—	IOC 2000s
Space-based particle beam weapon	Test early 1990s	—	Prototype late 1990s

\* Initial Operating Capability.

means, and methods of countering those delivery means. The **SALT I** agreements – the unlimited-duration **ABM** Treaty and the five-year Interim Agreement freezing levels of **ICBM** and **SLBM** launchers – were signed and entered into force in 1972. The **ABM** Treaty remains in force by its terms; the interim Agreement has expired but is still observed by both sides. Similarly, both sides are adhering to many aspects of the unratified 1979 **SALT II** Treaty, which places broader limits on strategic offensive delivery means.

The following sections discuss the **ABM** Treaty and the **ASAT** negotiations.

#### **ABM Treaty**

The **ABM** Treaty bans the deployment of **ABM** systems for defence of the territory of a country, and further bans the providing of a 'base' for such a defence.<sup>6</sup> It explicitly limits regional **ABM** deployments; it also restricts the kinds of **ABM** systems and components permitted to be developed and tested. The following listing gives the Treaty's principal limitations.

**SALT I: ABM Treaty** (signed 26 May 1972; in force from 3 October 1972; modified by Protocol signed 3 July 1974, and in force from 24 May 1976; unlimited duration, review every five years);

Bans deployment of **ABM** systems and their components, with the following exceptions:

Each side may deploy an **ABM** system at one deployment area, subject to certain limitations:

##### If National Capital Area:

No more than 100 **ABM** launchers and no more than 100 interceptors at launch sites

**ABM** radars within no more than six **ABM** radar complexes

Components must be within 150 km of side's national capital

##### If **ICBM** Silo Launcher Area:

No more than 100 **ABM** launchers and no more than 100 interceptors at launch sites

No more than two large phased-array radars comparable to US **PAR** and **MSR**

No more than 18 **ABM** radars, with less power-aperture than **MSR**

Components deployed within 150-km-radius circle containing **ICBM** launchers

Center of deployment area no less than 1,300 km from side's national capital.

#### Bans

Development, testing and deployment of:

Systems and components that are sea-based, air-based, space-based, or mobile land-based

An **ABM** launcher that can launch more than one **ABM** interceptor at a time

Systems for rapid reload of **ABM** launchers

Deployment of **ABM** systems based on other physical principles and including components capable of substituting for **ABM** interceptor missiles, launchers, or radars (this is implicit in the deployment limitations already listed, but an 'Agreed Statement' dealing with this was added presumably to clarify the handling of 'exotic' systems and components).

Giving non-**ABM** missiles, launchers, or radars **ABM** capabilities, or testing them in an **ABM** mode

Ballistic missile early warning radars that are not located along the periphery of the side's national territory and oriented outward

Transfer of **ABM** systems or components to other states

Deployment of **ABM** systems or components outside a side's national territory.

The United States and the Soviet Union clearly had different objectives in agreeing so to limit **ABM**. For their part, the Soviet leaders wanted to prevent the US from deploying an **ABM** system better than theirs, and they were willing to accept the offensive weapon 'freeze' of the Interim Agreement in exchange for the **ABM** limits. The United States, on the other hand, had primary interest in the offensive limits but also wanted **ABM** limits to stop the offence-defence build-up cycle and to ensure the penetration capability of her ballistic missile deterrent forces. During the negotiations the United States maintained that failure to replace the Interim Agreement with more complete limitations on strategic offensive arms could constitute a basis for withdrawal from the **ABM** Treaty.

The United States has sought more specificity in the terms and language of the **SALT** agreements than has the USSR. In some cases the Soviet Union agreed to clarifying statements. In other cases ambiguities or lack of agreement remained. To some extent these differences are inevitable in any negotiations because of differences in the systems the two sides have developed, and in terminology (exacerbated in this case by differences

in language). Moreover, one side may want to protect programmes or concepts that are unknown to the other side. And, it is particularly difficult to deal with systems and concepts that are only in the research or concept-development stage, where the engineering details of a system, or even the nature of and inter-relationships among its components, have not yet been determined.

The drafters of the ABM Treaty knew that new kinds of systems, such as some of those being considered under the US SDI programme might eventually reach a stage or development that could be viewed as inconsistent with the Treaty. Such future systems were dealt with in a number of ways.

As one example, the ban dealing with mobility (including a ban on space-based systems) was not limited to those kinds of components specifically mentioned in the Treaty – ABM radars, ABM launchers, and ABM interceptor missiles. Rather, it banned the development, testing and deployment of all mobile ABM systems and components'. These more general terms also apply to potential future systems 'to counter strategic ballistic missiles or their elements in flight trajectory'. Such future systems conceivably could include other kinds of components, but the Treaty drafters did not try to define what those future kinds of components might be. An initialled Agreed Statement did state that limitations on systems and components based on 'other physical principles and including components capable of substituting for ABM interceptor missiles, ABM launchers, or ABM radars' would be subject to discussion in the Standing Consultative Commission (scc) (the body set up to deal with questions of interpretation, implementation and compliance with the SALT I agreements) and agreement via amendment of the Treaty. Presumably such discussions would address the question of what constitutes a component – an important question in the SDI context.

The Treaty drafters also stopped short of trying to define precisely what constitutes an ABM capability – another important issue. This issue hinges on what constitutes the ability 'to counter strategic ballistic missiles or their elements in flight trajectory'. Among the kinds of defensive systems that must be distinguished from ABM systems are: anti-tactical ballistic missiles (ATBM), systems to counter non-strategic ballistic missiles; air defence surface-to-air missiles (SAM), systems; and anti-satellite systems. Particular attention was paid to

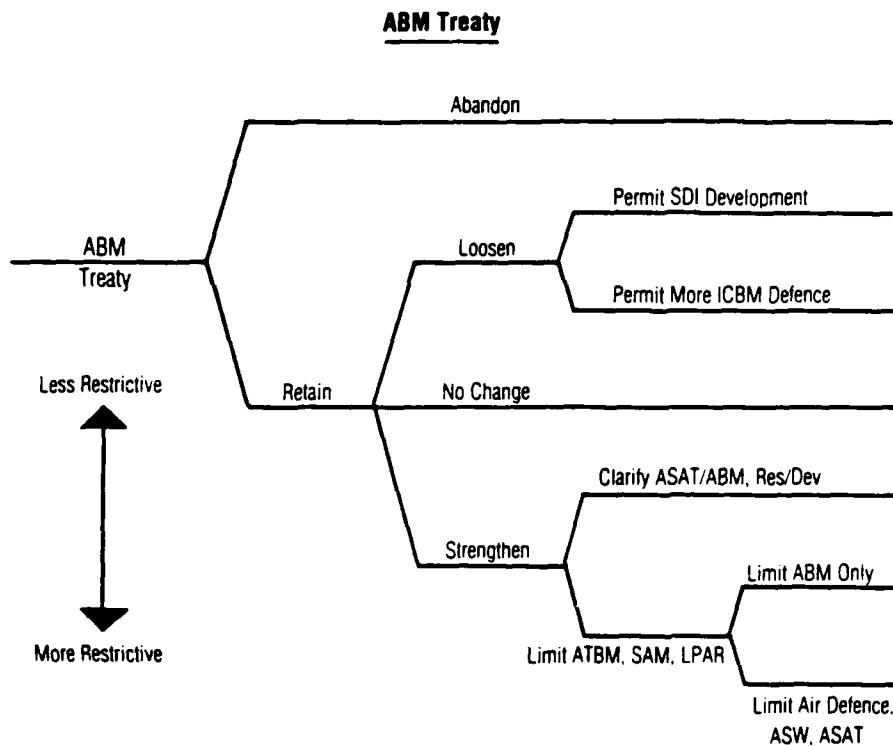
one of these – air defence SAM – during the negotiation of the Treaty, because of US concern that the Soviet SA-5 SAM system might have ABM capability. Because of the large numbers of SA-5s deployed, such a capability would give the USSR a significant base for a nationwide ABM system.

It is worth considering how the SA-5 question was dealt with both in the SALT I negotiations and subsequently in the scc. In the negotiations, the sides agreed not to give ABM capabilities to non-ABM interceptor missiles, launchers, or radars nor to 'test them in an ABM mode'. The United States further stated unilaterally her understanding of the kinds of 'events' that would constitute testing in an ABM mode. Later, after the Treaty came into force, the United States became concerned that certain testing of the SA-5 radar might be aimed at giving it an ABM capability. The United States raised this issue in the scc, and the testing in question ceased. The sides then agreed in the scc on more detailed criteria for permitted activities at ABM test ranges.

Thus, in the SA-5 case, the sides were unable or unwilling to agree in advance on criteria more explicit than 'tested in an ABM mode'. However, when a specific question arose, they were able to agree on more explicit criteria. Similarly, detailed dismantling and destruction procedures have been negotiated in the scc for existing systems, but no attempt has been made to negotiate such procedures for future systems.

The Interim Agreement negotiations provide a different type of example of a definitional issue that was left unresolved – the definition of a heavy ICBM. The United States sought to define a heavy ICBM as an ICBM with volume significantly larger than that of the Soviet SS-11 ICBM. The Soviet Union would not agree to that definition, for a reason that later became clear: Soviet leaders intended to deploy as a light ICBM the SS-19, which has a volume much larger than that of the SS-11. In this case, failure to achieve precision in a definition was, at least in part, due to conflict with a side's planned programmes.

A final example of a definitional issue deals again with a question of capability. The USSR claims that the large, phased-array radar near Krasnoyarsk is for space tracking; the United States claims it could be used as a ballistic missile early warning radar regardless of what other uses might be made of it. Such an issue could also arise regarding, say a system the testing side claimed



had only ASAT capability, but which the other side viewed as having potential ABM capability.

#### *ASAT Negotiations*

In 1978 the Carter Administration, as part of a comprehensive series of arms-control negotiations and discussions with the USSR, initiated bilateral negotiations on the control of ASAT. These talks were suspended in 1979 with little progress having been made, apparently in part because of Soviet insistence on banning the US space shuttle.

The focus of discussions on space arms control subsequently shifted to the UN, where the USSR has submitted draft treaties calling for a ban on the development and deployment of ASAT weapons. The Reagan Administration has argued that the Soviet initiatives pose profound verification problems.<sup>7</sup> It has been unwilling to enter into Soviet-proposed negotiations in the Conference on Disarmament. Rather, the US and her Allies have proposed discussions there on a broad range of space arms-control issues. The US also has been unwilling to join in the USSR's announced

moratorium on the launching of any type of ASAT weapon, arguing that to do so would leave the Soviet Union with a destabilizing advantage. This argument is made on the grounds that the United States must herself develop and deploy an ASAT for two reasons: to deter the Soviet Union from using ASAT, and to be in a position to disable Soviet low-altitude satellites that would be of tactical value during conventional hostilities.

But there is a third, more important reason that is not mentioned in the Administration's public position on ASAT arms control: a ban on ASAT would prevent many experiments essential to the SDI research and development effort. ABM systems capable of intercepts outside the atmosphere inherently have ASAT capability, as satellite orbits are easier to predict than are ballistic missile trajectories and satellites are far more fragile targets than re-entry vehicles. Also, many of the concepts for space-based components of ASAT and ABM systems are common to each other, with the principal differences being in the energy levels involved and in the target-handling (multi-shot) capacities

required. On both counts, ABM system requirements are far more stressing. Therefore, although the Reagan Administration states that the door is not closed to effective ASAT arms-control measures, there is little likelihood that it will make any concrete moves in that direction while it continues its current approach to ABM research and development.

Conversely, many of the tests one might do in developing an ASAT system would be relevant to ABM development, and many of them would be hard for the monitoring side to distinguish from actual ABM development. Therefore, continuing to permit ASAT testing, which is allowed under the current arms-control regime, will pose serious verification problems which, in the view of many threaten to undermine the ABM Treaty.

#### Critical Issues and Specific Questions

What are the critical issues raised by the ABM Treaty and what specific decisions will political leaders confront in the near future?

#### Issues

The above diagram depicts various decisions open to political leaders regarding the ABM Treaty. They range from abandoning the Treaty to strengthening it by adding constraints on systems that could undercut it - ATBM, SAM and large, phased-array radars (LPAR) - and constraints on other areas of strategic defence-air defence, anti-submarine warfare (ASW) and ASAT.

A variety of approaches are possible. For example, one might for the present retain the Treaty, but later modify it to permit SDI development and deployment. This would seem to be the approach preferred by the Reagan Administration, assuming that research would prove a comprehensive strategic defence programme to be lethal, survivable, cost effective and affordable.

Of the elements and concepts being considered in the SDI programme, radars and interceptor missiles are the only ones explicitly dealt with by the ABM Treaty.

Under the Treaty, ABM interceptor missiles may be developed, tested and deployed, provided their launchers are fixed and land-based and cannot be reloaded rapidly or launch more than one missile at a time. If deployed, the launchers must be within a permitted deployment area, and there

must not be more than 100 ABM interceptor missiles and 100 ABM launchers in that particular area.

ABM radars likewise must be fixed and land-based. They are subject to additional constraints, depending on whether they are part of a national capital area defence (in which case they must be located within no more than six ABM radar complexes, each complex having a diameter of no more than 3 km) or an ICBM silo launcher area defence (in which case they must be located within an area having a radius of 150 km and containing ICBM silo launchers). In the latter case, there may be no more than 20 ABM radars, two of them permitted to be large, phased-array radars and 18 of them required to have a power-aperture product less than 3 million watt-metres squared. Any other large, phased-array radars (other than those located at test ranges) must fall into one of the following categories:

- Radars for ballistic missile early warning, which must be located along the periphery of the side's national territory and oriented outward (so they will be relatively vulnerable to attack, have less accuracy for trajectory prediction, and therefore be less likely to assume the ABM role of battle management).
- Radars deployed for tracking objects in outer space.
- Radars deployed for use as national technical means of verification.

The reason for these restrictions on radars was the belief that large, phased-array radars would be an important element of a territorial defence. A limit on their deployment would therefore limit the potential for a side rapidly to break out from the treaty constraints, given the long time it takes to construct such radars.

Were the United States to decide to pursue a more conventional ABM defence of her ICBM, such development would be permitted - again, so long as the components (launchers, interceptor missiles, radars) were fixed and land-based. When the United States was planning to develop the LOADS system as an MX defence, the strategy was to postpone for as long as practical the testing of the components on mobile platforms, to delay the requirement to modify the Treaty. Radars and missile launchers could have been designed to be compatible with mobile platforms, the mobile

platforms could have been designed and constructed, and the radars and missiles could have been field-tested on and flight-tested from fixed platforms. The United States appears to be planning a similar approach in the SDI programme.

The SDI programme also includes satellite-borne sensors for warning, surveillance, tracking and battle management. Both sides deploy launch-detection satellites as permitted implicitly by the Treaty, which makes no mention of satellites used for early warning. However, the Treaty does not permit the use of satellites to substitute for 'ABM radars'. This means, for example, that they could not perform the task of discriminating warheads from decoys, doing fine tracking of warheads and interceptors and guiding interceptors. An infrared detection system that did this job in place of an ABM radar could be developed, but only in a fixed land-based configuration (an impractical concept for a strategic system, since clouds could severely limit its utility at times of crisis).

The other items listed above – lasers, rail guns and particle-beam generators – which would substitute for the interceptor missiles in a 'classic' ABM system, also are permitted to be developed only in a fixed, land-based configuration. Thus, some proof-of-principle testing of such systems could probably be carried out, but field testing them on satellites is prohibited. If the devices had less than ABM capability, the Treaty technically would allow them to be tested on satellites, but serious verification problems could result. Finally, such devices with ABM capabilities could conceivably be tested in space if they were launched from fixed, land-based launchers into a non-orbital ballistic trajectory, since it could be argued that these were fixed, land-based devices (even though their ultimate application might be on a satellite or a sea-based platform).

In deciding on the approach to take for tests that the other side might find difficult to verify or view as circumventions, a key consideration would be the precedent one would be setting for the actions of the other side. The Reagan Administration appears more intent on conducting the tests it deems necessary for the SDI programme than on ensuring verifiability. Its approach to SDI argues that tests are permitted so long as an ABM capability is not present or the devices being tested are 'subcomponents' rather than 'components' of ABM systems. The criteria used for these determinations have not been stated publicly. Others,

such as *Longstreth, Pike and Rhinelander*, would have the US seek Soviet agreement on explicit definitions of 'develop and test' and 'components'. Further, they recommend banning ASAT systems and severely limiting certain kinds of directed-energy testing in order to avoid undercutting the Treaty.<sup>8</sup>

Finally, one potential element being addressed under SDI – the nuclear-driven X-ray laser – would violate the Limited Test Ban Treaty if it were tested other than underground, and the Outer Space Treaty if it were ever deployed in orbit.

#### *Questions*

(1) *Should the ABM Treaty be retained?* Few are calling for immediate abandonment of the ABM Treaty. Although the Reagan Administration urges a programme that could lead to the eventual deployment of extensive strategic defences, it wants to retain the Treaty in the near term. Arguments have been made for abandoning the ABM Treaty on the grounds that the USSR is clearly violating certain limitations (for example, with the placement of early warning radars) and has deployed or is about to deploy non-limited systems having some ABM capability (SA-10, SA-X-12), whereas the US has carefully complied with all the Treaty's limitations, and the existence of the Treaty inhibits support for US ABM R&D.

A counter argument is that, given the numbers and capabilities of the offensive forces on both sides, there is little choice for the present but to rely on the doctrine of deterrence by threat of retaliation. The Treaty's limitations support that doctrine under the current circumstances. Moreover, the USSR has an operational ABM system, with open production lines, and appears much better prepared than the US to deploy a widespread defence rapidly if so permitted. Also, the Treaty's constraints are important to the viability of the British and French nuclear deterrents. Neither of these countries favour the Treaty's abandonment.

(2) *Should the ABM Treaty be relaxed to permit SDI development beyond the research stage?* The answer appears to be 'No' at least for the near term. The Department of Defense has said that the research necessary to determine whether to proceed into systems development will be completed in the early 1990s. The United States would not want to give the USSR the opportunity to

conduct such development ahead of the United States.

Before the United States could proceed with full-scale or prototype development of any of the space-based concepts, she would have to change or withdraw from the Treaty. However, some aspects of ABM components might be examined during testing for applications requiring less-than-ABM capability. For example, the United States might investigate pointing and tracking techniques as part of the development of a space-based laser for ASAT purposes. Although such tests might not prove that a type of device would work in an ABM role (which would require higher power, faster response, etc.), they could show that a type of device would *not* be practical for ABM purposes. Of course, a side product of such testing would be concern on the part of the other country that the testing side was already violating the ABM Treaty, as it may be difficult to verify the capability of the hardware being tested.

(3) *Should the ABM Treaty be relaxed to permit US deployments for protecting ICBM?* An ABM system designed to take advantage of location uncertainty (for example, by occasional deceptive moving of radars and interceptor missiles and launchers) would significantly raise the number of RV required to cause a given level of damage in an attack against an ICBM force. For example, in the case of the shell-game deployment scheme the United States considered for MX, fielding one mobile ABM radar and three mobile ABM interceptor missiles per ICBM would have the same effect as doubling the number of protective shelters. Such a deployment would require modifying the Treaty, however, to permit mobile ABM radars and launchers and to permit the numbers of radars and launchers to exceed 20 and 100, respectively. The Reagan Administration currently shows no interest in shell-game basing, but this kind of ABM defence could provide similar leverage for road-mobile basing, which is being considered for the new small ICBM.

Before developing such a system, one would want to ensure it was the most cost-effective way to enhance ICBM survivability, and be convinced that making modifications to (or withdrawing from) the ABM Treaty was in the US interest, taking account of what the Soviet Union might do.

Most would agree that such an ABM deployment would be stabilizing if the other side could be

confident that the deployment did not provide wide-area defence or a rapid break-out capability for such a defence. This approach might have worked in the MX-defence context for a system such as LOADS, with its obviously limited defence capability. But it is unlikely one could convince the Soviet Union that a system derived from, or part of, the SDI programme would be so limited. For SDI, the stated objective of the types of systems being considered is a nationwide defence, and the DOD stresses the importance of a large area of coverage by the interceptor missiles planned for the terminal tier of the system.

Further, such modification of the Treaty for protecting offensive assets would appear to be inconsistent with the Reagan Administration's long-term objective of defence dominance, which is diametrically opposite to the strategic concept on which the ABM Treaty is based.

(4) *Should the ABM Treaty be clarified with regard to what is meant by 'components' and 'development'?* Assuming the Treaty will remain in force at least into the next decade, it may be desirable for the US and USSR to agree more precisely on certain terms that will bear on the sides' actions over the next few years, particularly with regard to experiments they may conduct in space.

An issue of this kind arose in connection with an experiment in the Talon Gold programme.<sup>9</sup> This experiment, to have been conducted on the space shuttle, was to investigate precision acquisition, tracking and pointing issues associated with space-based lasers. Some argued that the experiment would violate the ABM Treaty, in that it would constitute the development of a space-based component based on 'other physical principles' and capable of substituting for an ABM component. The DOD decided to cancel the particular programme, saying that it wanted to do the work as part of the co-ordinated SDI effort. However, some implied the delay reflected concern that the experiment would have violated the Treaty. In any event, this case provides an example of the kind of questions that will arise as experiments related to directed-energy or other weapons are conducted in space.

The Treaty speaks of 'systems' and 'components', but does not define the terms. It provides examples - ABM systems for the former, ABM radars, ABM launchers, and ABM interceptor

missiles for the latter. But it does not state what might be considered a component of an ABM system of a different nature (based on 'other physical principles', for example). One could argue that, based on the examples provided in the Treaty, the word 'component' means a major element of the system, comparable to a radar, launcher, or missile in its contribution to the overall system. The sides might agree explicitly on such an interpretation. However, questions would still arise.

One way to provide more guidance would be for the sides together to postulate different overall systems, describe them, and then agree on what constitutes a component for Treaty purposes, and perhaps what level or kind of testing might be permitted before it would be considered to conflict with the Treaty. This would be difficult now, given the formative state of the US programme and the certain Soviet unwillingness to volunteer anything about their plans or to facilitate unilateral US progress. Such issues may have to be addressed on a case-by-case basis, in the light of the actual programmes as they develop.

The meaning of 'develop and test' was addressed in SALT I. During ratification, US officials made clear the US interpretation that development and testing in the Treaty context refer to 'field testing' as opposed to 'laboratory' development and testing. A key aspect of the interpretation was that the activity referred to must be verifiable by national technical means. Thus, for example, components of a space-based directed-energy ABM system could be built and tested in an indoor laboratory without violating the Treaty. On the other hand, a prototype of a component that was part of a fixed, ground-based directed-energy ABM system could be field tested – for example, tested on an outdoor range (presumably, even if it were also a component of a space-based system).

The United States might seek Soviet agreement to the US interpretation of 'develop and test', in part to remove an ambiguity caused by differences in the Russian and English texts of the portion of the Treaty banning components that are not fixed and land-based. The Russian text uses 'create' where the English text uses 'develop'. Again, however, it is unlikely that, given their position on SDI and the ABM Treaty, the Soviet leaders would at this time agree to any interpretation that the Administration would accept.

A different reason for the US to seek clarification of these definitional issues would be to enhance US confidence in Soviet compliance. To date, there appears to be little if any US concern that Soviet space and directed-energy activities have violated the ABM Treaty, although, as noted earlier, the Reagan Administration considers the USSR to have significant programmes in the military applications of space and directed energy. Nevertheless, as these Soviet programmes progress into the field-testing stage and power levels increase, areas of ambiguity could arise. The issues, however, would probably concern whether devices have ABM capability rather than whether the activity constitutes development and testing.

(5) *Should the ABM Treaty be strengthened to deal better with systems such as ATBM, SAM and LPAR?* When the ABM Treaty was negotiated, two major US concerns were: preventing the upgrading to ABM capability of Soviet non-ABM systems, such as air-defence SAM; and preventing the establishment of a radar base for a Soviet nationwide ABM system. The USSR would go only so far to meet these concerns. Therefore it is not surprising that there are now questionable Soviet testing and construction programmes in these areas. The Soviet motivation for the Krasnoyarsk radar probably derives from the cost of alternatives that would provide equivalent coverage and still be within Treaty constraints, as well as the US programme to expand and modernize her ballistic missile early warning radar system (some of it outside US territory). However, the blatancy of the Krasnoyarsk radar siting and orientation is surprising to many. The US Delegation to the Geneva negotiations has apparently been charged with addressing these topics as matters of some priority. How might these issues be dealt with so as to satisfy both sides?

There seems little that can be done with regard to the SAM (or ATBM), short of restrictions on the capabilities of those systems themselves. (The USSR has adamantly resisted any limitations on air defences in past negotiations, and her position is unlikely to change.) Many SAM inevitably have *some* capability against *some* strategic ballistic missiles, depending on factors such as the re-entry vehicle's speed (a function of the missile's range), ballistic co-efficient (which affects atmospheric slowdown), and radar cross section (detectability). What distinguishes a useful ABM system is

the ability to intercept intercontinental-range ballistic missiles having low-radar cross section (rcs), high-ballistic-coefficient rv and, if it is to do a satisfactory job of defending territory, to do so over an area of thousands of square miles. It is unlikely the systems in question can do this, although their potentially large numbers tend to compensate for a small coverage area.

Time will alleviate this problem to some extent as the United States phases out her shorter-range SLBM, the principal candidates for defence by these systems. Also, the development and deployment of penetration aids is an important unilateral measure the United States can take. On the other hand, SAM capability will likely continue to improve, making the problem worse. Perhaps the most effective Treaty provision the US could seek would be measures to enhance monitoring of the testing of borderline systems, so as to increase the likelihood of detecting testing of SAM systems against targets representative of strategic ballistic missiles. There may be no choice, however, but to live with the problem, relying on unilateral measures and the 'tested-in-an-ABM-mode' criterion for establishing ABM capability.

With regard to the Krasnoyarsk radar, it is difficult to envision any Soviet actions short of dismantlement that would convince the US it is not a ballistic missile early warning radar. Even the on-site inspections mentioned by Ambassador Dobrynin early this year would be of little if any help. However, the United States could seek Soviet agreement that these radars will not be significantly defended (for example, Soviet agreement to the US unilateral statement in SALT I that the US would regard any increase in the defences of ballistic missile early warning radars by SAM as inconsistent with the Treaty). Also, the US could seek a numerical limit on such radars, freezing their numbers at the levels currently planned by the two sides.

(6) *Should the ABM Treaty be complemented by limitations on other forms of strategic defence, such as air defence and ASW?* This question would be relevant if it were decided that defence dominance is unachievable, impractical, or undesirable, and therefore the United States should continue to rely on deterrence as it exists now – that is, with offence dominance. In this case, it might be desirable to seek additional limitations aimed at ensuring the survival and penetration capability of the sides'

deterrent forces. Such limitations could be consistent with the negotiation of significant reductions in the numbers of offensive weapons – some would argue much more so than would an increase in defences.

Consideration has been given to such limitations from time to time. A fundamental problem is separating strategic from other needs. The Soviet Union would be expected to resist limitations on her air defences, in light of the large investment in them and the needs to defend against air attacks from nearby countries. The USSR has, on the other hand, been more interested than the United States in limitations on ASW, presumably because of American superior submarine hiding and hunting capabilities. Whether her view might change in light of their reported narrowing of the US lead in submarine technology remains to be seen. Another impediment to ASW limitations would be their possible effect on the US Navy's needs for ASW to protect Western shipping.

#### Conclusion

The Reagan Administration's Strategic Defense Initiative programme has put the ABM Treaty under considerable stress. SDI proponents and critics, arms-control advocates and sceptics, and the US, her allies and her adversaries all have their agenda for what should be done concerning the Treaty:

- The US maintains that the Treaty should be retained in the near term, while at the same time embarking on a programme of strategic defence that is diametrically opposed to the Treaty's fundamental principles.
- The Soviet Union voices support for the Treaty, condemns the US SDI programme, and argues for even tighter constraints on ABM technology, while at the same time building a huge radar that blatantly violates one of the Treaty's key provisions.
- Champions of the ABM Treaty seek to strengthen it by banning activities that could undercut its limitations, while hoping that the Soviet Union will improve her sad record of SALT compliance.
- US allies voice concern about the effect of SDI on strategic stability and the ABM Treaty, which they believe continues to play a critical role in deterrence, while at the same time attempting to

appear at least minimally supportive of the US SDI effort.

Ultimately, the fate of the SDI effort and the ABM Treaty will likely be determined by a combination of US budgetary considerations (as the SDI grows and competes for scarce resources); the technical results of research and development activities in ABM and related areas such as ASAT; Soviet activities (including force deployments, R&D, and arms-control negotiations and compliance); and the results of American Presidential elections.

In the meantime, the stresses on the ABM Treaty can best be dealt with in the same way similar stresses have been in the past: in the workmanlike atmosphere of the Standing Consultative Commission, as they arise. Future problems, including those associated with SDI, can be anticipated and even predicted, and it is important that the US government carefully prepare its position with regard to them, taking account of potential Soviet activities as well as those the US plans to undertake. But trying to deal bilaterally with such future problems in the abstract is not likely to work, particularly given the current and probable near-future state of relations between the two sides.

#### NOTES

<sup>1</sup> Caspar W. Weinberger, *Annual Report to the Congress – Fiscal Year 1983* (Washington DC: USGPO, 8 February 1982), p. 111–63.

<sup>2</sup> Department of Defense, *Soviet Military Power 1985*, Fourth Edition (Washington DC: USGPO, 1985).

<sup>3</sup> *Ibid.*, p. 10.

<sup>4</sup> Don Oberdorfer, 'US, Soviets Remain Far Apart As Geneva Talks Resume Today', *The Washington Post*, 30 May 1985, p. A25.

<sup>5</sup> Department of Defense, *op cit.* in note 2, pp. 43–5.

<sup>6</sup> United States Arms Control and Disarmament Agency,

*Arms Control and Disarmament Agreements*, 1982 Edition, pp. 139–47, 162–3.

<sup>7</sup> *Report to the Congress on US Policy on ASAT Arms Control*, (Washington DC: USGPO, 31 March 1984), pp. 14–16.

<sup>8</sup> Thomas K. Longstreth, John E. Pike and John B. Rhinelander, *The Impact of US and Soviet Ballistic Missile Defense Programs on the ABM Treaty* (Washington DC: Report for the National Campaign to Save the ABM Treaty, March 1985), pp. 66–7, 75–7.

<sup>9</sup> Walter Pincus, 'Pentagon Acts to Obey ABM Treaty', *The Washington Post*, 26 March 1985, p. A12.

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